## Space Weather Forecast

Issued on Tuesday, 13 June 2023 at 13:23 Local

**This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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### Space Weather Forecast Headline: Slight chance of Minor Radio Blackout R1 throughout. Peak clight chance of Minor Geomagnetic Storm G1 Thursday into Friday (UTC).

### Analysis of Space Weather Activity over past 24 hours

**Solar Activity:** Solar activity has been low over the past 24 hours, with occasional low-level Common-class flares recorded peaking at 12/23:27UTC.

All but the first six hours of this reporting period suffered an imagery outage of some satellite data which has hampered the immediacy of monitoring. The resolution of some of the alternative sources for imagery is also lower. At present then, there appear to be five sunspot regions of sufficient size to manifest on available imagery. The two largest of recent days both showed decay in their trailing regions especially, while a new sunspot region in the southeast showed a weak growth tendency, else remaining spots appeared stable.

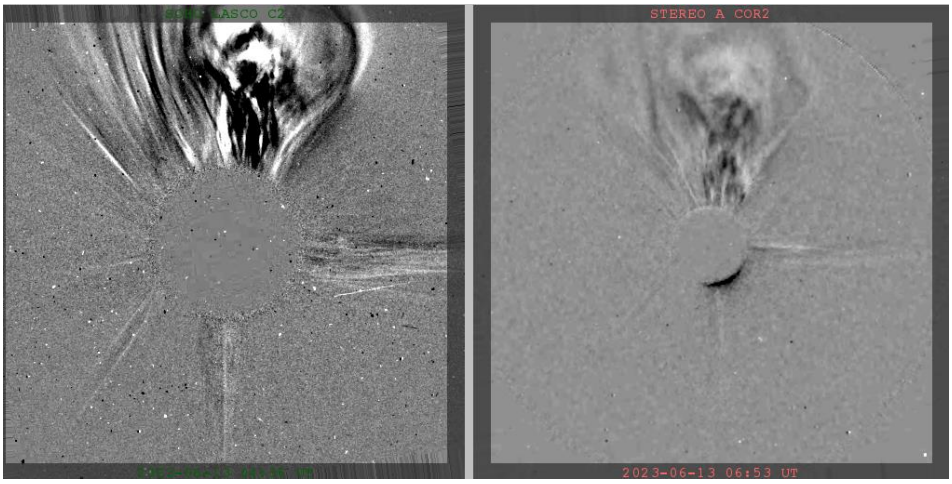


**Figure 1: Satellite difference imagery of a high latitude northwest-directed CME (ahead and above the track of the Earth in its orbit) from 13/0200UTC. While modelling results are awaited, this feature is thought most likely to bypass Earth to no effect.**

Satellite imagery for the period showed a west-directed narrow Coronal Mass Ejection (CME) through the UTC afternoon of Monday 12 June. This has been modelled as a miss and plays no part in the forecast. A large 'filament' and 'prominence' eruption (arcs of plasma on the Sun's face and edge respectively) also lifted off in the period around 13/0200UTC from high solar latitude in the northwest. Preliminary modelling results suggest that this is directed north and west of the Sun-Earth line, i.e. with no impact expected. No definitive Earth-directed CMEs were therefore observed in the last 24 hours.

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**Solar Wind / Geomagnetic Activity:** The solar wind showed an ongoing slightly elevated fast wind environment, likely due to one of a pair of 'coronal holes'. Solar wind speeds showed an erratic but roughly level tendency within this, with the number of particles comprising the solar wind at background levels. Their associated magnetic field showed a smooth tendency near background levels, with the north-south component erratic and not strongly anti-aligned with the Earth's at any point (to limit effects).

The net result of the above solar wind measures was for provisionally quiet geomagnetic activity throughout.

**Particles / Solar Radiation:** No solar radiation storms were observed.

## Four-Day Space Weather Forecast Summary

**Solar Activity:** Solar activity is expected to be mainly low. A net increase in the number of sunspots on the Sun appears likely in the four days, however the degree to which this increases the flare risk will be assessed with each sunspot that presents on the eastern solar horizon for analysis.

**Solar Wind / Geomagnetic Activity:** A CME that left the Sun on 9 June is now thought most likely to have passed the radius of Earth's orbit to no effect at Earth (angled mainly behind). There are no other Earth-directed CMEs.

The forecast otherwise comprises the current weak fast wind further weakening though midweek, replaced by a stronger but still modest fast wind from another 'coronal hole' from Thursday 15 June.

Current Quiet geomagnetic conditions are now thought more likely to persist in the near-term given the now likely 09 June CME miss. Activity should increase to a peak of slight chance of Minor Geomagnetic Storm G1 on Thursday 15 June, perhaps continuing into the start of Friday 16 June.

**Energetic Particles / Solar Radiation:** No solar radiation storms are expected given the relative lack of significant sunspot groups.

**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 1 | 1 | 20 | 20 |
| Strong | G3 | No | 1 | 1 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

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| X Ray Flares | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|---|---|---|---|---|---|---|
| Probability | | | (%) | (%) | (%) | (%) |
| Active | R1-R2 M Class | No | 20 | 20 | 20 | 20 |
| Very Active | R3 to R5 X | No | 1 | 1 | 1 | 1 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|---|---|---|---|---|---|---|
| Probability (Exceedance) | | | (%) | (%) | (%) | (%) |
| Active | ≥ S1 | No | 1 | 1 | 1 | 1 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |
| * S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$) | | | | | | |

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